Virginia PFAS Occurrence & Monitoring Subgroup
Virginia Department of Health Office of Drinking Water
January 13, 2021
Virtual Meeting by WebEx

Call to Order

Robert Edelman with the Office of Drinking Water called the meeting to order at 2:00 p.m. The meeting was virtual via WebEx. Minutes and the PowerPoint presentation will be posted on Town Hall. Refer to the PowerPoint presentation along with these minutes.

The following members attended:

Jamie Hedges (Fairfax Water)
Jessica Edwards (Loudoun Water)
Mike McEvoy (Western Virginia Water Authority)
Henry Bryndza (Consultant, formerly with DuPont)
Jeff Steers (Virginia DEQ)
Dwight Flammia (VDH, State Toxicologist)
Anna Killius (James River Association)
Tony Singh (VDH Office of Drinking Water)
Jack Hinshelwood (VDH Office of Drinking Water)
Bob Edelman (VDH Office of Drinking Water) - VDH Lead

Members of Public:

Amanda Waters (Aqua Law)
Karen Anderson (Friends of Shenandoah River)
Bryan Vining (Enthalpy Analytical)
Lindsay Boone (Enthalpy Analytical)
JP Verheul (Enthalpy Analytical)
Patrick McKeown (ECT2 Montrose Environmental Group)
Paul Nyffeler (Chem Law)
Scott Powers (Fairfax Water)
Dr. William Mann, MD (public)
Carroll Courtney (Southern Environmental Law Center)
Darya Minovi (Center for Progressive Reform)

ODW staff:

Christine Latino (ODW)
Nelson Daniel (ODW)

Subgroup Logistics (refer to slide 4): Bob Edelman stated that he will report the Subgroup findings at the larger workgroup on January 19th.

Currently, ODW is still working on a file sharing platform. We will likely be using SharePoint and we are anticipating it will be ready by Friday, 1/15/21. We will notify workgroup members when this is ready.

Report on monitoring and occurrence study methodologies used in other states (see PowerPoint beginning on Slide 9). Robert Edelman discussed his finding with the group by state (see each state summary slide). Items in red text are noteworthy.

Significant observations that could inform Virginia's monitoring and occurrence study are as follows (slide 27):

- Some states have not completed a sampling program after UCMR3
- California's approach of targeting wells close to airports and landfills or UCMR3 detections yielded many detections
- Monitoring near military bases with known PFAS releases yielded detections
- Colorado found PFAS in all surface water samples
- EPA Method 537.1 most frequently used
- Only New Hampshire mentions both 537.1 and 533.
- Single sample used in many states
- Some states require confirmation samples if PFAS is detected
- PWS collected samples in most states
- States are frequently paying for occurrence studies, PWSs for compliance samples
- Public Notification requirements differ, depending on state HAs or MCLs.
- Possible seasonal nature to detections (highest number in Q3)
- No detections of PFAS in field blanks in Michigan (contractor sampling)
- NH does not require field blanks

The Workgroup provided the following input:

> EPA Method 533 is the newest method for sampling and meets VA's monitoring requirement. However, many labs do not have accreditation for 533. Because of COVID, some labs have not been able to finish accreditation. Consider accreditation requirements when selecting a laboratory.
>
> A member reported that Representative Guzman and Senator Deeds are proposing budget amendments to provide an additional $60,000 in general funds to study PFAS occurrence.

The Subgroup reviewed that HB 586 states, "…the Department of Health shall sample no more than 50 representative waterworks and major sources of water…" The Subgroup has approximately $40,000 available for PFAS analytical and shipping. Assuming $200 per sample, this gives 200 samples. Assuming that each water sample has a field reagent blank (FRB), this yields a possible 100 water samples. (Slide 28)

The limitation of no more than 50 waterworks plus major sources of water and the limitation of the budget are fundamental limitations to the monitoring and occurrence study.

A member pointed out that the cost of $200 per sample corresponds to EPA Method 537.1 and the cost for Method 533 is higher.

The Subgroup discussed:

- The number of samples per location, realizing that most state occurrence studies used one sample per location and some states used confirmation samples upon detection of PFAS. The subgroup needs to decide what is meant by a "detection of PFAS."
- A laboratory representative suggested the workgroup to select method-reporting limits (MRLs) for each analyte carefully. Lindsey offered to share MRLs of analytes with the group.
- Setting up lab instruction for when a FRB is not required. Tony suggested FRBs at a reduced frequency, perhaps 20% of samples.

- There is a concern about multiple people sampling. Lindsey suggested the people collecting samples should be required to take a short training course.
- Collect one sample per location. If PFAS is detected then an additional confirmation sample will be taken.
- Lindsey suggested eliminating field reagent blanks.
- There is also concern regarding setting reporting limits instead of detection limits. Lindsey will share detection limits and reporting limits of common analytes with the group.
- Lindsey suggested when setting up lab instruction to add "A field blank is not required." Tony suggested adding blanks at a reduced frequency.
- Scott reviewed the proposed sampling instructions. It is important that instructions are clear and simple. Analytical laboratories should include sampling instructions with sample kits and some offer virtual training. He suggested checking with the lab of choice on sampling instructions and virtual training methods and use their information to save the group time and costs. Another member pointed out that the instructions are only for finished samples and not raw water samples.

The Subgroup recommended the following (also on Slide 29):

- One sample per sample location
- Training for samplers
- Limited FRB, target for confirmation samples
- Specify the Method Reporting Limits (MRL)
- At least one confirmation sample upon detection > MRL of PFAS
- Take confirmation samples soon after a detection is reported

<u>Analytical Method Selection</u>

The Subgroup reviewed the homework from last meeting (see slide 31):

The Subgroup reviewed considerations when selecting an analytical method (see slide 33). The group discussed:

- Method 533 has the analytes required by the legislation. Method 537.1 is missing PFBA.
- The Subgroup could select a short list, consisting of the six analytes in the legislation, based on limiting the scope of the investigation or to save cost. New Hampshire published pricing for analytical services and showed a savings of $12 per sample when the laboratory reported on only 4 analytes rather than the entire list for EPA 537.1.
- Availability of laboratories with accreditation for Method 533 may be limited. Some laboratories may have "NELAP Accreditation" and ability to run Method 533, but due to the pandemic and other limitations, have not yet achieved accreditation for Method 533. One person suggested that the request for proposals specify "NELAP Accredited Laboratory" or "DOD Accredited Laboratory" rather than "Accredited for Method 533". A member suggesting building quality standards into the RFP, and the lab would demonstrate that they already comply with the requirements for obtaining accreditation for the method. Another person suggested that there are laboratories already "Accredited for Method 533".
- Tony explained that ODW expects to issue a Request for Proposals (RFP) in the next three weeks or so. ODW has been in contact with some laboratories to obtain pricing information that we are using for project planning.

The group recommended:

- Select Method 533
- Complete list of analytes
- Laboratory meeting NELAP Accreditation requirements

The Subgroup reviewed homework comments on the proposed sample site selection criteria (Slide 35). Bob explained that he paraphrased the following comments from the homework:

1. Limiting to only 17 large waterworks does not address small and rural communities.
2. Risk based approach is dependent on the methodology of identifying sources at risk. Unclear if this approach is sufficient to use for the entire study.
3. Concern about excluding waterworks/sources in the Groundwater Management Areas.
4. Major source samples taken from large waterworks mirror or duplicate the large waterworks approach. Perhaps consider higher risk sources or another approach.

Based on these comments, and new information from DEQ, ODW has made some changes to the monitoring study. The approach is as follows:

- Available funding limits the number of sampling sites, frequency of sampling
- Maximum public health risk reduction (look at systems serving significant populations)
- Risk to potential PFAS contamination (look at sources with elevated risk of contamination)
- Limited to a total of 50 waterworks and sources of water

Bob described a Hybrid Approach as follows:

1. Largest waterworks (17) in Virginia serve appx. 4.5 million consumers (slides 37 – 38)
2. Sample locations based on risk potential for PFAS contamination using VDH - DEQ risk information (slides 39 – 43)
3. Major water supplies – James River, Potomac River, etc. (beginning Slide 44)

ODW received new data from DEQ identifying locations of unlined landfills, facilities with direct discharges to surface waters, and Publicly Owned Treatment Works (POTWs) with Significant Industrial Users. DEQ identified these discharges based on facility SIC codes and likelihood of past or present use or discharge of PFAS chemicals.

Using DEQ's list of unlined landfills and a list of large airports from USGS, ODW developed the map on Slide 40. ODW identified waterworks groundwater wells within 1 mile of the landfills and airports using revised criteria in Slide 41. This is limited to community and nontransient noncommunity waterworks. (Slides 42 and 43). This group of sample sites represents both systems with higher risk of PFAS contamination and groundwater systems.

Bob explained that this methodology results in a list of 21 wells and ODW did not prioritize them further, for example, by landfill size, airport size, etc.

Bob explained the approach for sampling major water supplies is to request waterworks to sample untreated water from surface water intakes or wells (Slide 44). Virginia waterworks have over 120 surface water sources, thousands of wells. The Subgroup needs to decide how to prioritize these sources for sample site selection. Some options include:

1. Select the largest sources (12 large waterworks, 21 Water Treatment Plants, 22 sources). Sampling the finished water at the 17 large waterworks covered this group. Slide 45 shows the locations of the intakes for this group. Slide 46 shows the location of direct discharges and POTW discharges in relation to this group.
2. Select the next group of large waterworks (based on gallons per day or population)
3. Select surface sources based on risk (downstream of POTWs and/or direct discharges) Slide 47 shows the locations of all waterworks intakes in relation to direct discharges and POTWs.

The group discussed the balance between the large waterworks, groundwater systems at risk of PFAS contamination, and significant water sources. The Subgroup should think about if the approach adequately balances large populations versus rural systems, surface water versus groundwater, potentially impacted systems versus others. Slide 48 shows the possible numbers of samples from each category.

Carroll likes the idea of identifying high-risk surface water sources.

Jeff – Commented that the intakes of the 17 large waterworks are downstream of some POTWs and direct discharges, so these intakes are covered through sampling finished water. He suggested picking some rural intakes on smaller streams or rivers, downstream of direct discharges with a higher risk of PFAS. Bob has asked Jeff to investigate small rural water systems and receiving streams that may be impacted by PFAS and get back with the group.

Bob encourages the group to share with him any thoughts and ideas you may have on this topic.

Public Comments – A time for public comments was offered, but no one made public comments.

Due to time constraints, the meeting was adjourned at 4:30 p.m.

Establishing Regulatory Limits for PFAS in Virginia Drinking Water

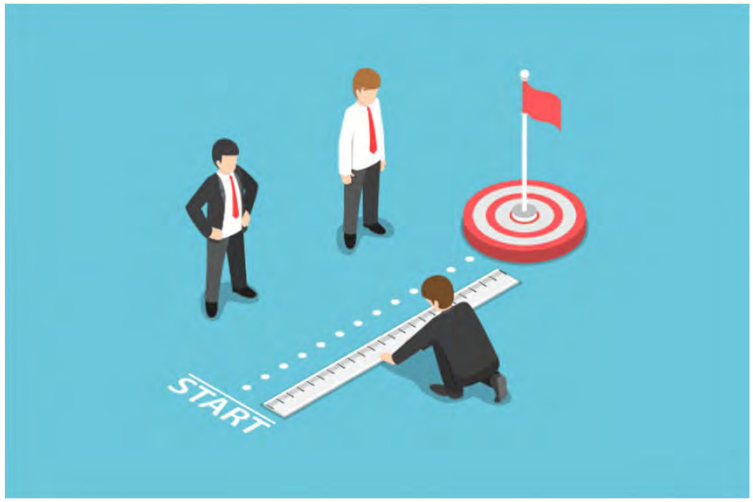
Monitoring and Occurrence Subgroup

Bob Edelman
Virginia Department of Health
January 13, 2020

PFAS Workgroup Meeting Overview

Meeting Overview

- Member Attendance
- Subgroup Logistics, Objectives
- Schedule and Deliverables
- Highlights and Summary of State Occurrence Studies
- Virginia's PFAS Occurrence Study Plan
- Public Comment
- Next Meeting



Subgroup Members

David Jurgen (City of Chesapeake)
Jamie Hedges (Fairfax Water)
Mark Estes (Halifax County Service Authority)
Jessica Edwards (Loudoun Water)
Mike McEvoy (Western Virginia Water Authority)
Henry Bryndza (DuPont)
Jeff Steers (VDEQ)
Dwight Flammia (State Toxicologist)
Anna Killius (James River Assoc)
Tony Singh (VDH ODW)
Bob Edelman (VDH ODW) - VDH Lead*

Subgroup Logistics

Bob Edelman will act as facilitator

Tony Singh will assist, other ODW representatives may attend

We will report back to the Workgroup on findings and recommendations

Members will have assignments or action items

Make decisions by consensus or if not by consensus, vote by members

We will provide time for public comments

Subgroup Logistics

Data sharing – An electronic file sharing platform (Google Drive)

Meeting information on Town Hall (www.townhall.virginia.gov).

Admin support – Office of Drinking Water (ODW) staff

Meeting Schedule – Monthly (as needed)

Meetings – Virtual via Webex

Email – Communications to Members – do not reply-all

Virginia PFAS Workgroup – Objectives

- **Determine the occurrence of PFAS in drinking water throughout the Commonwealth,**
- Identify possible sources of PFAS contamination,
- May develop recommendations for specific maximum contaminant levels (MCLs)

Six specific PFAS, including:

- Perfluorooctanoic acid (PFOA)
- Perfluorooctane sulfonate (PFOS)
- Perfluorobutyrate (PFBA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexane sulfonate (PFHxS)
- Perfluorononanoic acid (PFNA)

Other PFAS “as deemed necessary”

Subgroup Deliverables

1. Research PFAS Occurrence/Sampling Studies in other states – internal deliverable – Week of January 11, 2021
2. Virginia PFAS Sampling Study Plan – January 19, 2021
3. Organize, tabulate, and summarize Virginia PFAS Occurrence data - TBD

States With Numerical PFAS Limits

Washington
- Banned in firefighting foam and food packaging
- Proposed drinking water standard

Vermont
- 20 PPT (PFAS)
- Drinking water health advisory for 5 PFAS

Massachusetts
- 70 PPT (PFAS)
- State guidance for concentrations of 5 PFAS in drinking water

New Jersey
- Set PFNA standard at 13 ppt
- Weighing proposed standards for:
  PFOA at 14 ppt
  PFOS at 13 ppt

California
- 14 PPT (PFOA)
- 13 PPT (PFOS)
- Drinking water notification guidance

Colorado
- PFOA/PFAS listed as hazardous waste
- 70 PPT (Combined PFOA/PFOS)
- Groundwater quality standard for El Paso County only

Minnesota
- 35 PPT (PFOA)
- 27 PPT (PFOS)
- Health-based guidance values

Michigan
- 70 PPT (Combined PFOA/PFOS)
- State standard for concentrations in drinking water

- New Jersey
- Connecticut
- Maine
- Michigan
- Pennsylvania
- Colorado
- California
- Massachusetts
- New Hampshire

Bloomberg Environment

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State PFAS Monitoring and Occurrence Programs

Summarize the following:

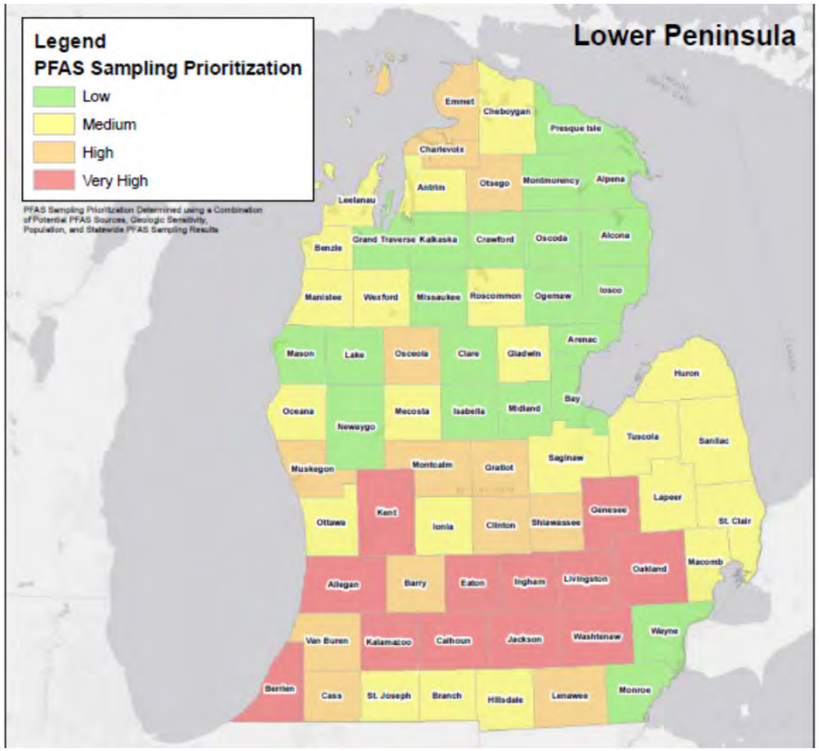
- Scope of sampling
- Sample location selection criteria
- Analytical Methods, target analytes, detection levels
- Sampling Frequency
- Who collected samples
- Summary of occurrence data, PFAS detections
- Source of funding for sampling
- Lessons learned

Massachusetts – 2020-2021

- Free sampling offered voluntarily to all PWS, focus on CWS
- Raw and entry points
- EPA 537.1
- Quarterly monitoring; if no detection after 2 samples, last 2 samples are waived. Sampling will be used for compliance/grandfathered data.
- PWSs collect samples. Standard protocol per EPA 537.1
- 30 systems detected PFAS over 20 ng/L and are taking action
- Initial free round of sampling provided by state: $8.4 MM budgeted

Michigan Phase 1 – 2018

- Supplies Sampled:
  1,112 CWS, 460 Schools, 152 Daycares, 17 Tribal Entities
- 1,741 Total Facilities
- Entry Points - Provide initial statewide screening for PFAS for approximately 75% of Michigan's population. Prioritized by county by potential PFAS sources, geologic sensitivity, population, and PFAS results.
- Raw water at surface WTPs
- Drinking Water: EPA 537.1, Reporting Limit = 2 ng/L



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Michigan Phase 1 (Cont'd)

- Raw Surface Water: Isotope Dilution Method
- One sample.
- If PFOA + PFOS combined exceeded 70 ng/L, confirmation samples were collected immediately. If a school or daycare detected total PFAS > 10 ng/L, a confirmation sample was collected within two weeks.
- Sampling by contractor teams. Sampling teams participated in a two-week training program before sampling.

Michigan Phase 1 (Cont'd)

- 2 systems detected PFOA + PFOS > 70 ng/L
- 62 systems detected total PFAS between >10ng/L and < 70 ng/L
- Funded by State.
- To demonstrate concentrations are reliably and consistently below the HA level: Recommend annual monitoring for all CWS, schools, daycares and tribal entities for total PFAS < 10 ng/L. Recommend quarterly monitoring for others.
- No detections of target analytes were reported in the field blanks

New Hampshire

- Community Water Supplies: 1,095 of 1,880 sources
- Entry Points
- EPA 537.1 or EPA 533 Reporting Limit = 2 ng/L
- Required Analytes: PFOS, PFOA, PFNA, PFHxS
- Annually or every 3 years (based on concentration of target analytes)
- PWSs collect samples. Standard protocol per EPA 537.1
- 350 wells detected target analytes. 89 wells exceed MCLs
- Funded by water systems.
- Field Blanks are not required.
- $168 for 4 analytes vs all analytes for $180 by EPA 537.1
- Contracts and pricing for PFAS analysis available.

Minnesota – East Metro Area

- Targeted public and private wells in East Metro: 800+ private wells – Multi-county area impacted by plumes
- Entry Points MDH Method 555: PFBS, PFHxS, PFOS, PFBA, PFPeA, PFHxA, PFOA; Reporting Limit = 15 ng/L (State Laboratory)
- Ongoing, targeted sampling of private wells. Sample wells never sampled. Sample down gradient of wells with high levels. Resample wells slightly below guidance values
- Sampling by Contractor
- Sample locations selected based on groundwater movement and plume areas

Minnesota - CWS

- Targeted 17 CWS based on proximity to Class B AFFF use
- Entry Points
- MDH method 555 and MDH method 551
- One round of samples (inferred)
- Sampling by MDH (inferred)
- Trace amounts or ND - All PFCs below MDH health based exposure limits MDH

California – UCMR3 (2013 -2015)

- All systems > 10,000; selected < 10,000
- Entry Points
- EPA Method 537 Reporting Levels: PFOA - 20 ng/L PFOS - 40 ng/L
- 4 Quarterly samples for SW systems
- 2 samples for GW systems
- Sampling by Waterworks
- Sources with detections:
  PFOS - 36
  PFOA - 32
- Sampling funded by Waterworks (large) / EPA (small)

California – Assembly Bill 756 (2019)

- Allowed the State Water Resources Control Board to order water systems to sample for PFAS
- Wells (AB 756), Entry Points (optional)
- ~600 Systems meeting:
  - < 2 miles of commercial airport
  - < 1 mile of selected MSW landfill
  - Wells in UCMR3
    < 1 mile of UCMR3 wells with detections of PFOA and PFOS
- EPA Method 537.1
- Quarterly sampling.

California (Cont'd)

- If PFAS is detected, the system has the option to take one or two confirmation samples within 30 days. If both confirmation samples are ND, the initial result is disregarded. If confirmation sample is not collected, detection is confirmed.
- Sampling by Waterworks
- Field Reagent Blank Required, Field Duplicate Recommended
- Detects: PFOS – 402; PFHxS – 399; PFOS – 340; PFBS -314; PFHxA – 307; PFHpA – 190; PFNA – 107; PFDA - 40
- Sampling funded by Waterworks
- Highest number of detections during Q3.
- Criteria for targeting may be applicable to VA

Colorado - 2020 PFAS Sampling Program

- PWS serving communities, schools and workplaces and fire district wells
- Voluntary sampling at: 400 PWS - entry points, 15 Fire Districts – wells, 71 surface water sources
- EPA Method 537.1 - Inferred based on the 18 analytes and reported detections
- One sample. Voluntary.
- All samples from lakes and rivers had detections.
- Most prevalent chemicals: PFOS, PFOA, PFHxS, PFBS, PFhxA, and PFHpA with detections in > 20% of the samples. PFNA was detected in > 10% of the samples.
- 25% of PWSs had PFAS detected in Entry Points

Colorado - 2020 PFAS Sampling Program (Cont'd)

- State Legislature awarded $500,000 to Colorado Department of Public Health and Environment - free to waterworks
- PN encouraged with detections, templates provided.
- Using EPA HA values 70 ppt PFOA+PFOS
- Detailed report and results published on web
- Approach is applicable with funding

Washington – UCMR3

- 113 systems > 10,000
- 19 systems < 10,000
- Entry Points per UCMR3
- EPA Method 537 - Reporting Levels: PFOA - 20 ng/L, PFOS - 40 ng/L

Washington – UCMR3

- 4 Quarterly samples for SW, 2 samples for GW
- Sampling by Waterworks
- PFAS detected in three water systems, total of 5 wells.
  PFOS PFHxS PFHpA PFOA PFNA PFBS
- Sampling funded by Waterworks (large) / EPA (small)
- DOD identified military PWSs with contamination; other systems sampled voluntarily thereafter.
- Did not complete an occurrence study before proposing state action levels and monitoring requirements.

Virginia – UCMR3

- 87 systems, 72 large systems and 15 small systems
- Entry Points per UCMR3
- EPA Method 537 - Reporting Levels: PFOA - 20 ng/L,
  PFOS - 40 ng/L
- 4 Quarterly samples for SW and 2 samples for GW
- Sampling by Waterworks
- Two CWS had detections. Subsequent sampling (not part of UCMR3) did not confirm the detections
- Sampling funded by Waterworks / EPA
- DOD identified military/related PWSs with contamination.

Ohio - 2020

- 1550 PWS, including 250 schools and daycares
- 951 CWS
- 589 NTNC
- 4 TNC
- Entry Points and Raw Water
- EPA Method 537.1

Ohio - 2020

- Analytes limited to list and Reporting Levels:
  - PFBS 5 ng/L
  - PFHXS 5 ng/L
  - GENX 25 ng/L
  - PFOS 5 ng/L
  - PFOA 5 ng/L
  - PFNA 5 ng/L
- One Sample - Ohio EPA my conduct follow-up sampling
- Sampling by Contractor
- Two systems above state's action levels
- Sampling funded by Ohio EPA
- 6% of PWSs detected PFAS
- Field Reagent Blanks required at each entry point/raw water sample pair

Summary

- Some states have not completed a sampling program after UCMR3
- California's approach of targeting wells close to airports and landfills or UCMR3 detections yielded many detections
- Monitoring near military bases with known PFAS releases yielded detections
- Colorado found PFAS in all surface water samples
- EPA Method 537.1 most frequently used
- Only New Hampshire mentions both 537.1 and 533.
- Single sample used in many states
- Some states require confirmation samples if PFAS is detected
- PWS collected samples in most states
- States are frequently paying for occurrence studies, PWSs for compliance samples
- Public Notification requirements differ, depending on state HAs or MCLs.
- Possible seasonal nature to detections (highest number in Q3)
- No detections of PFAS in field blanks in Michigan (contractor sampling)
- NH does not require field blanks

Virginia PFAS Sampling Study Plan

Scope of sampling, number of samples, frequency

- HB 586: "…the Department of Health shall sample no more than 50 representative waterworks and major sources of water…"
- Budget: $40,000 for PFAS analytical + shipping
- Approximately $200/sample
- $40,000 ÷ $200/sample = 200 samples
- Assume FRB samples for each sample = half of samples are FRB
- Yields a total of 100 water samples

Number of samples per location

- Most state occurrence studies used one sample per location
- Some states used confirmation samples upon detection of PFAS

Recommendation:

- One sample per sample location
- Training for samplers
- Limited FRB, target for confirmation samples
- Specify the Method Reporting Limits (MRL) for confirmation samples
- At least one confirmation sample upon detection > MRL of PFAS
- Take confirmation samples soon after a detection is reported

Sample Protocol Considerations

- Waterworks personnel to collect samples
- Detailed sampling protocol/instructions
- Proposing a sampling instructional video
- Samples results are sensitive to PPE and clothes worn by sampler

- Homework was: Request review proposed sampling instructions with waterworks/laboratory staff for feedback
- Any comments on Waterworks staff will collect entry point samples?

Homework Results

1. Method 533 vs 537.1? Two persons preferred 537.1, one 533.
2. A basis for excluding PFBA from analytes?

   PFBS is used more widely than PFBA, Method 537.1 less costly than 533

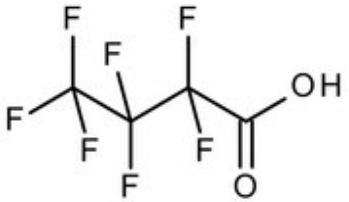
   PFBS is somewhat more toxic than PFBA based on state standards
3. Method will be inconsistent with other states, existing VA data – is this a problem? No input – probably not a factor. Presumably, EPA methods generate comparable results.
4. Method Detection Limits? 2 ppt? Accept whatever detection limits are available – not really a deciding factor.
5. Experience with methods, labs on PFAS monitoring? No input – VDH is discussion with labs.

Analytes in HB 586

Alpha Analytical: Available PFAS Methodologies and Target Compound Lists	CAS	US EPA	US EPA	Alpha ID	Alpha TOP	RI/ ME	NJ	PA/ IN	CT/ VT	MA	NH	OH	NY	DoD	MI	WI
(all applicable compound subset lists are also available)	#	537.1	533	ID	TOP											
PERFLUOROBUTANOIC ACID - PFBA	375-22-4		x	x	x						x		x	x	x	x
PERFLUOROPENTANOIC ACID - PFPeA	2706-90-3		x	x	x						x		x	x	x	x
PERFLUOROHEXANOIC ACID - PFHxA	307-24-4	x	x	x	x						x		x	x	x	x
PERFLUOROHEPTANOIC ACID - PFHpA	375-85-9	x	x	x	x				x	x	x		x	x	x	x
PERFLUOROOCTANOIC ACID - PFOA	335-67-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PERFLUORONONANOIC ACID - PFNA	375-95-1	x	x	x	x		x		x	x	x	x	x	x	x	x
PERFLUORODECANOIC ACID - PFDA	335-76-2	x	x	x	x					x			x	x	x	x
PERFLUOROUNDECANOIC ACID - PFUnA	2058-94-8	x	x	x	x								x	x	x	x
PERFLUORODODECANOIC ACID - PFDoA	307-55-1	x	x	x	x								x	x	x	x
PERFLUOROTRIDECANOIC ACID - PFTrDA	72629-94-8	x		x	x								x	x	x	x
PERFLUOROTETRADECANOIC ACID - PFTA	376-06-7	x		x	x								x	x	x	x
PERFLUOROHEXADECANOIC ACID - PFHxDA	67905-19-5			x												x
PERFLUOROOCTADECANOIC ACID - PFODA	16517-11-6			x												x
PERFLUOROBUTANE SULFONIC ACID - PFBS	375-73-5	x	x	x	x			x			x	x	x	x	x	x
PERFLUOROPENTANE SULFONIC ACID - PFPeS	2706-91-4		x	x	x									x	x	x
PERFLUOROHEXANE SULFONIC ACID - PFHxS	355-46-4	x	x	x	x				x	x	x	x	x	x	x	x
PERFLUOROHEPTANE SULFONIC ACID - PFHpS	375-92-8		x	x	x								x	x	x	x
PERFLUOROOCTANE SULFONIC ACID - PFOS	1763-23-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PERFLUOROHEPTANE SULFONIC ACID - PFHpS	375-92-8		x	x	x								x	x	x	x
PERFLUOROOCTANE SULFONIC ACID - PFOS	1763-23-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Analytical Method Considerations

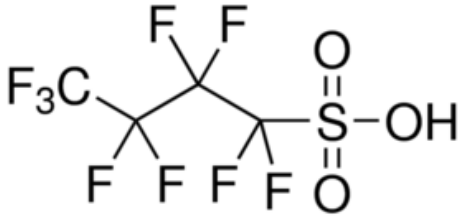
Selecting an analytical method:



PFBA

- **Problem with EPA 537 and 537.1: PFBA is not included.**
  - **PFBA – listed in 5 states; 1 states with standards**
  - **PFBS – listed in 7 states; 3 states with standards**
  - **PFBS – MN DW standard of 2 ppb; TX GW cleanup std of 34 ppb**
  - **PFBA - MN DW standard of 7 ppb; TX GW cleanup std of 71 ppb**

- **Methods 537.1 and 533 are limited to clean water.**
- **Non-potable water: Use other methods**



PFBS

Method Selection

Considerations:

- EPA Method 537.1 most often selected by states
- EPA Method 533 will detect additional compounds
- Cost – 533 costs $20-40 more than 537.1
- Method detection limits differ
- PFBA not in Method 537.1
- Short or long list of analytes?
  - Cost savings
  - Limit scope to HB586 list

Recommend: Select Method 533, complete list of analytes, subject to meeting NELAC Accreditation requirements

Proposed PFAS Sampling/Monitoring Study - Homework

Site selection criteria comments:

1. Limiting to only 17 large waterworks does not address small and rural communities
2. Risk based approach is dependent on the methodology of identifying sources at risk. Unclear if this approach is sufficient to use for the entire study.
3. Concern about removing waterworks/sources in the Groundwater Management Areas
4. Major source samples taken from large waterworks mirror or duplicate the large waterworks approach. Perhaps consider higher risk sources or another approach.

Proposed PFAS Sampling/Monitoring Study

Approaches based on:

- Available funding → number of sampling sites, frequency of sampling
- Maximum public health risk reduction
- Risk to potential PFAS contamination
- Limited to 50 waterworks and sources of water

Hybrid Approach based on (depends on budget):

1. Largest waterworks (17) in Virginia serve appx. 4.5 million consumers
2. Sampling – based on risk potential for PFAS contamination – VDH - DEQ data/risk
3. Major water supplies – James River, Potomac River, etc.

17 Large Waterworks

PWSID	PWS name	City / County	Population	# SWTPs	# Raw	# EPs	#CCs
6059501	FAIRFAX COUNTY WATER AUTHORITY	FAIRFAX COUNTY	1074422	2	2	2	1
3810900	VIRGINIA BEACH, CITY OF	VIRGINIA BEACH	446067	0	0	0	1
3700500	NEWPORT NEWS, CITY OF	NEWPORT NEWS	407300	2	2	2	0
4041845	CHESTERFIELD CO CENTRAL WATER SYSTEM	CHESTERFIELD	320658	1	1	1	2
4087125	HENRICO COUNTY WATER SYSTEM	HENRICO	292000	1	1	1	1
6107350	LOUDOUN WATER - CENTRAL SYSTEM	LOUDOUN	286202	1	1	1	1
3710100	NORFOLK, CITY OF	NORFOLK	234220	2	2	2	0
6013010	ARLINGTON COUNTY	ARLINGTON	215000	0	0	0	1
4760100	RICHMOND, CITY OF	RICHMOND CITY	197000	1	1	1	0
3550051	CITY OF CHESAPEAKE - NORTHWEST RIVER SYS	CHESAPEAKE	166704	2	2	2	0
2770900	WESTERN VIRGINIA WATER AUTHORITY	ROANOKE CITY	155000	4	4	4	0
6153600	PWCSA - EAST	PRINCE WILLIAM	153000	0	0	0	1
6510010	ALEXANDRIA, CITY OF	ALEXANDRIA	146970	0	0	0	2
6153251	PWCSA - WEST	PRINCE WILLIAM	130001	0	0	0	2
3740600	PORTSMOUTH, CITY OF	PORTSMOUTH	120400	1	3	1	0
6179100	STAFFORD COUNTY UTILITIES	STAFFORD	112285	2	2	2	0
6177300	SPOTSYLVANIA COUNTY UTILITIES	SPOTSYLVANIA	84390	2	2	2	0
Totals				21	23	21	12
Total EP + CC				33			

17 Large Waterworks

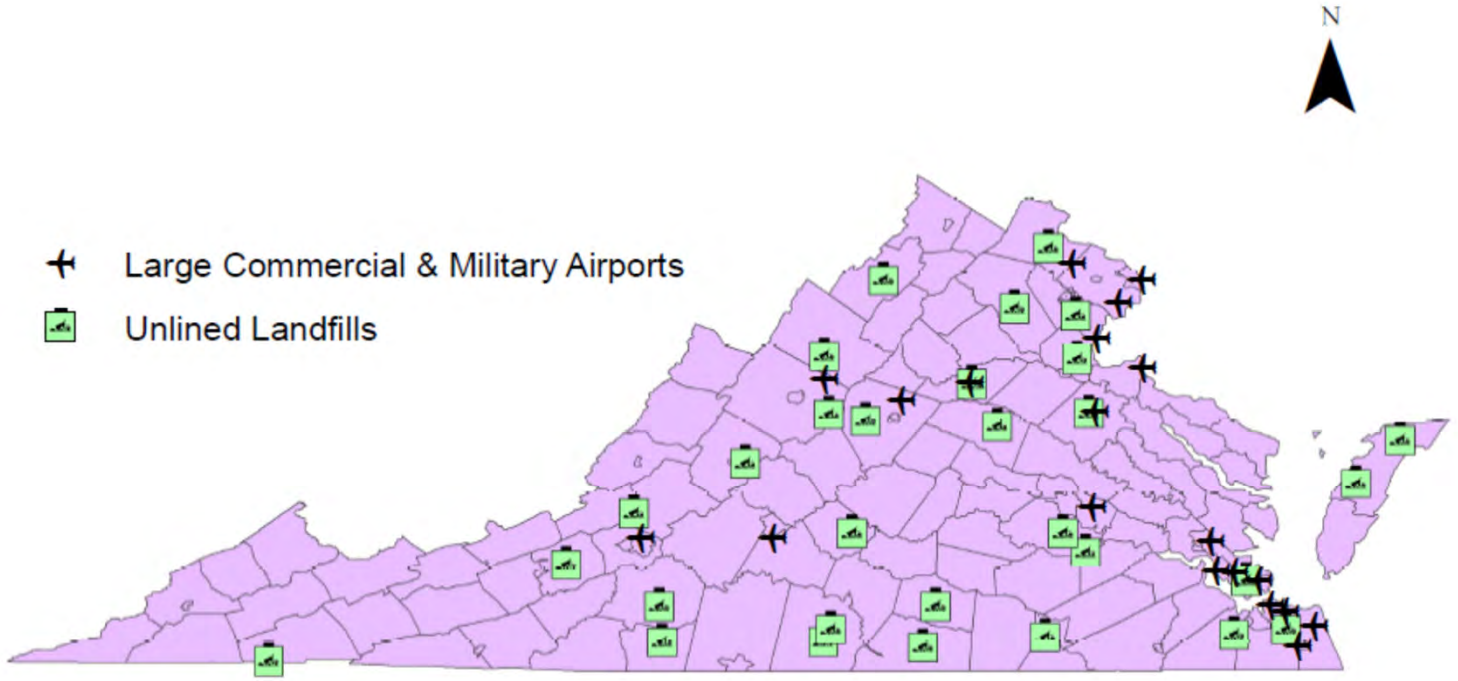
Surface water systems:

- 23 Raw sources
- 21 Water Treatment Plants
- 21 Entry Points
- 12 Consecutive Connections

- Entry Points + Consecutive Connections = 33 locations – All 17
- Entry Points only – 21 locations – covers 16 of 17, samples in 12 WW
- Raw Sources – 23 locations

Potential PFAS Contamination Risk

- New list of unlined landfills from DEQ
- Prioritize based on risk due to proximity to certain activities:
  - Landfills – DEQ List
  - Airports (large) based USGS airport data
- Focus on groundwater sources for community and NTNC waterworks
- We also have DEQ lists of potential sources of PFAS:
  - POTWs with Significant Industrial Users
  - VPDES discharge permits
- Use these to evaluate Significant Sources (future)



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0 50 100 200 Miles

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Revised Methodology

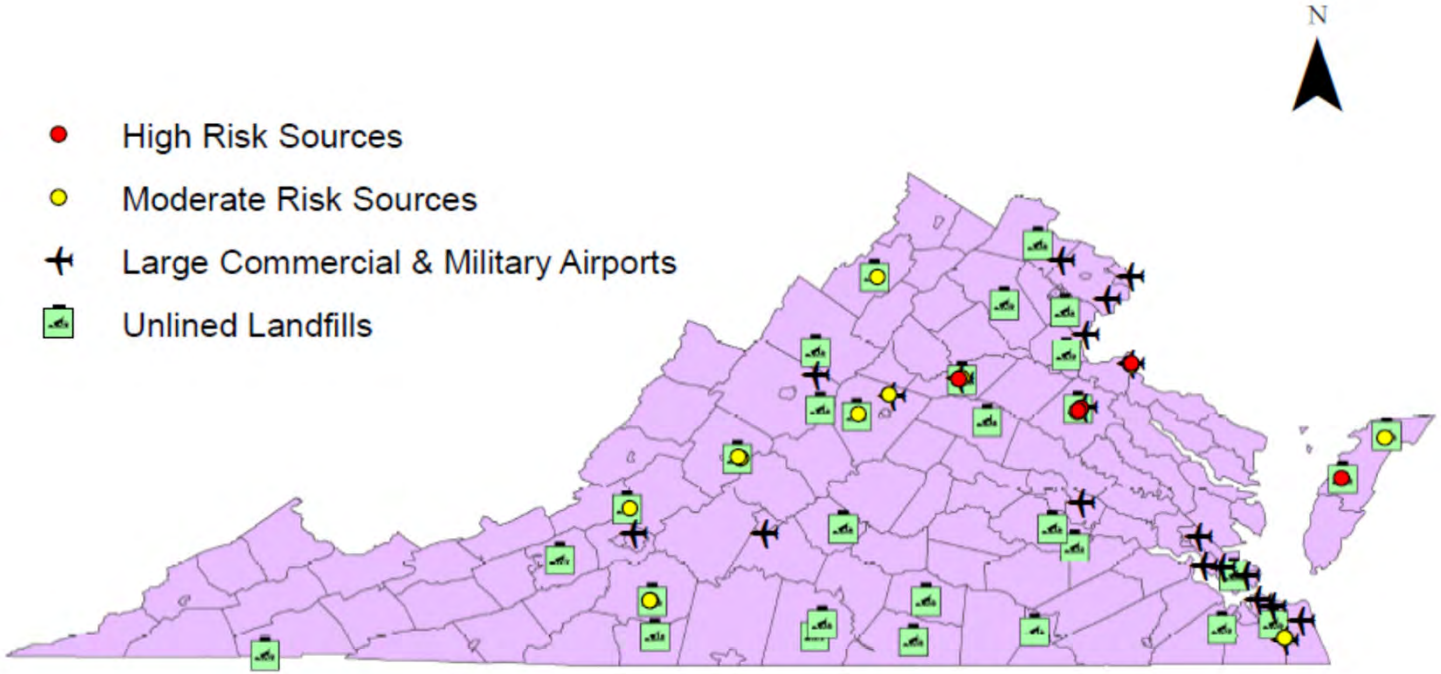
High Risk = within ½ mile of large airport or unlined landfill

Medium risk = within 1 mile of large airport or unlined landfill

1. Start with list of sources that are ranked as high and medium risk from GIS
2. Select community and NTNC waterworks
3. Sort from highest population to lowest

What's different from last time? Previously:

- High Risk was = within 1 mile
- Community waterworks only
- Excluded east of I-95



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Results from Risk

System Name	PWSID	Facility Name	ID	System Type	Population Served
NAVAL SUPPORT FACILITY_ DAHLGREN	6099340	WELL 3 - BLDG 274A (RESERVOIR WELL)	WL003	C	11000
NAVAL SUPPORT FACILITY_ DAHLGREN	6099340	WELL 1 - BLDG 1288 (BRONSON WELL)	WL001	C	11000
BOWLING GREEN_ TOWN OF	6033550	WELL 4	WL004	C	1152
PUNGOTEAGUE ELEMENTARY SCHOOL	3001790	WELL	WL001	NTNC	610
RSA ROUTE 20	6137120	WELL #2 (MAY LANE)	WL002	C	387
FT A P HILL - HEADQUARTERS	6033251	WELL HQ #2 (PWAT 28)	WL028	C	180
NAVAL SUPPORT FACILITY_ DAHLGREN	6099340	WELL 2 - BLDG 1190 (CASKEY WELL)	WL002	C	11000
BOWLING GREEN_ TOWN OF	6033550	WELL 5	WL005	C	1152
BOWLING GREEN_ TOWN OF	6033550	WELL 1A	WL01A	C	1152
LONG HOLLOW	2163400	LHWDC WELL 1	WL001	C	578
LONG HOLLOW	2163400	LHWDC WELL 2	WL002	C	578
EARLYSVILLE FOREST	2003255	WELL 6	WL006	C	488
EARLYSVILLE FOREST	2003255	WELL 5	WL005	C	488
PEACOCK HILL SUBDIVISION	2003650	WELL 8	WL008	C	475
RSA ROUTE 20	6137120	WELL #1 (PORTER RD)	WL001	C	387
MOUNTAIN VIEW ELEM SCHOOL	2163560	MTN VIEW WELL	WL001	NTNC	250
ROANOKE CEMENT COMPANY	2023180	WELL - ROANOKE CEMENT COMPANY	WL001	NTNC	190
FT A P HILL - HEADQUARTERS	6033251	WELL HQ #1 (PWAT 29)	WL029	C	180
FRANKLIN COUNTY COMMERCE CENTER	5067137	WELL NO. 5	WL005	NTNC	103
NALF FENTRESS FIELD	3550615	WELL NO. 2	WL002	NTNC	40
NALF FENTRESS FIELD	3550615	WELL NO. 1	WL001	NTNC	40

6

15

Sampling Major Water Sources

ODW can request:

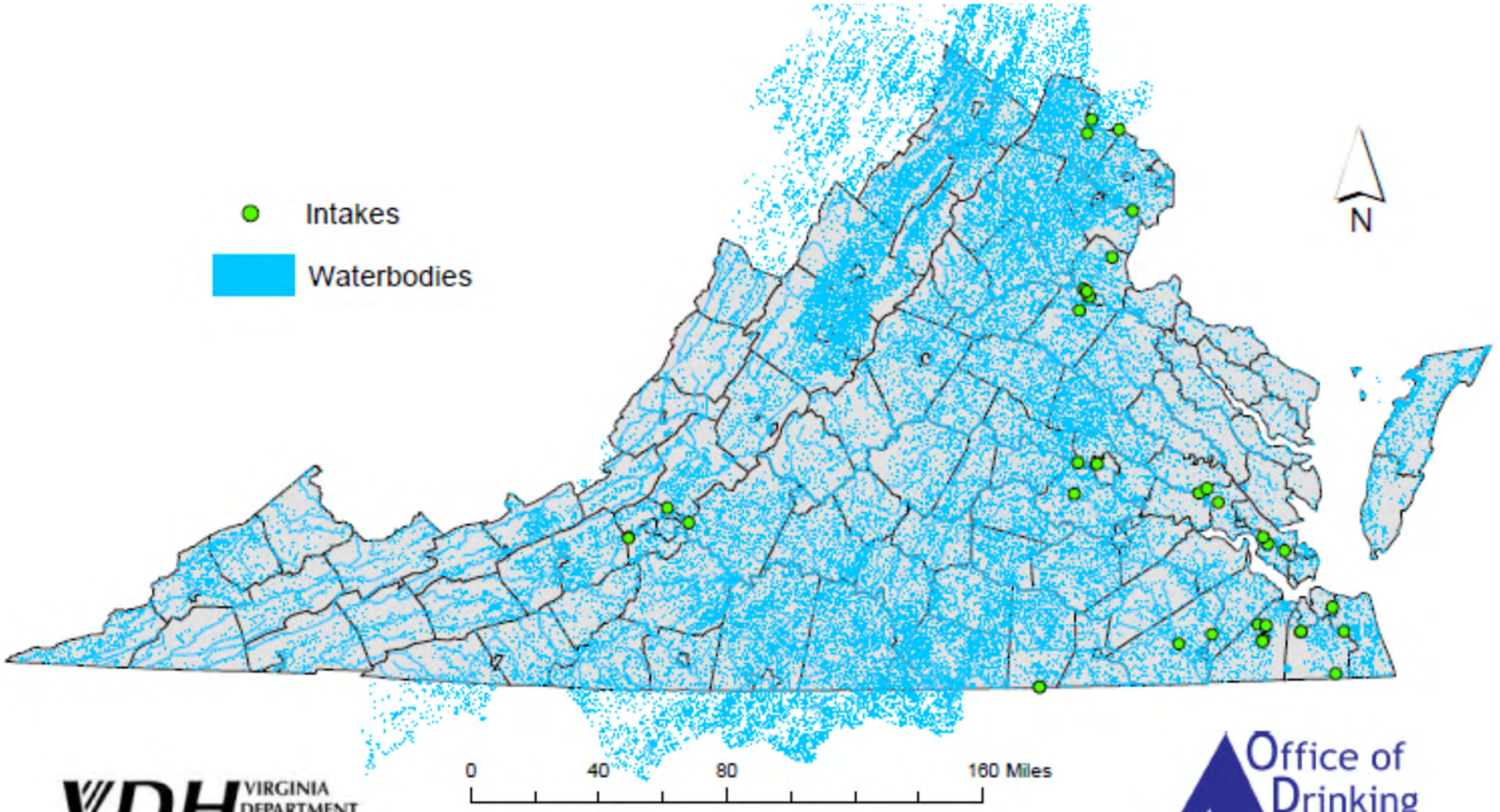
- Sampling at the water intakes to the Waterworks, prior to treatment
- Sampling at groundwater wells and springs, prior to treatment

This would involve:

- Utilities staff to collect samples, FRB and ship it back to the Lab for analysis (No cost to the utility; shipping included)
- Sampling instructions and guidance will be provided

Over 120 surface water sources, thousands of wells to select from. What to do?

- Select the largest sources (12 large waterworks, 21 WTPs, 22 sources)
- Select the next group of large waterworks (based on gallons per day or population)
- Select surface sources based on risk (downstream of POTWs with SIUs, Industry)



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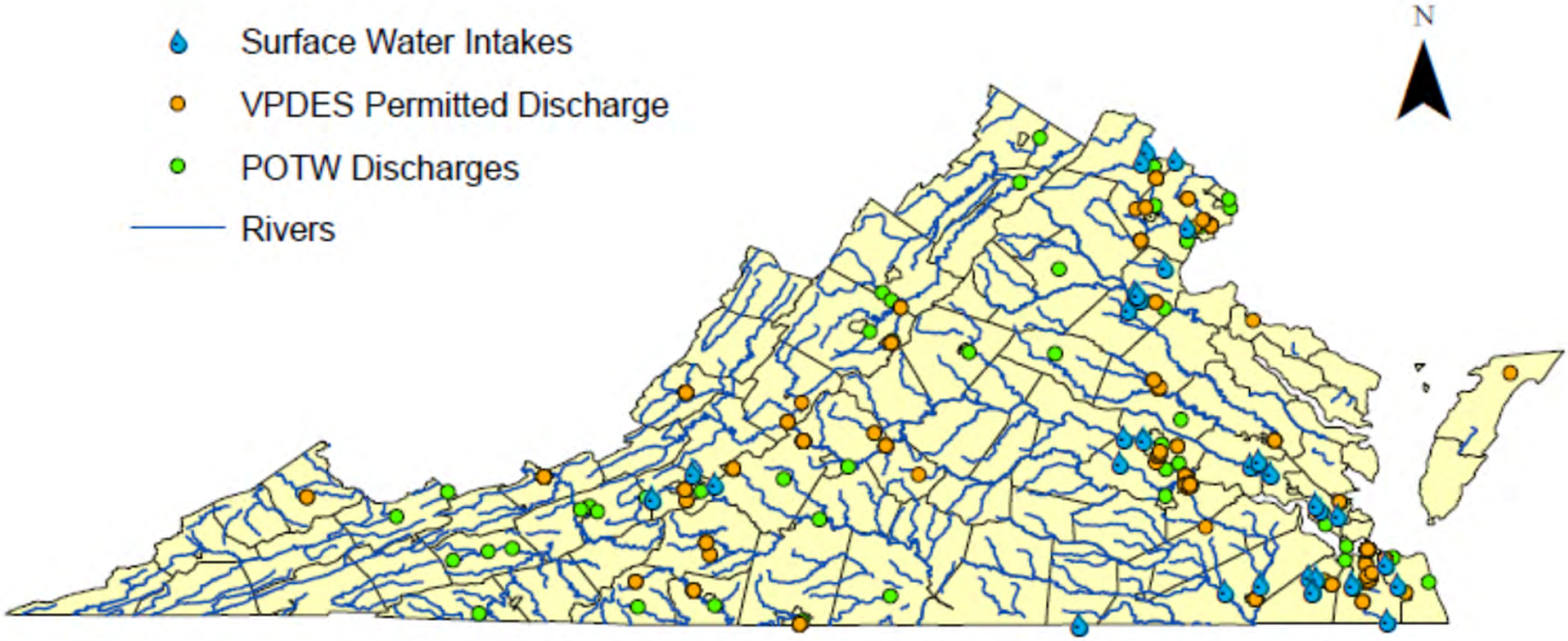

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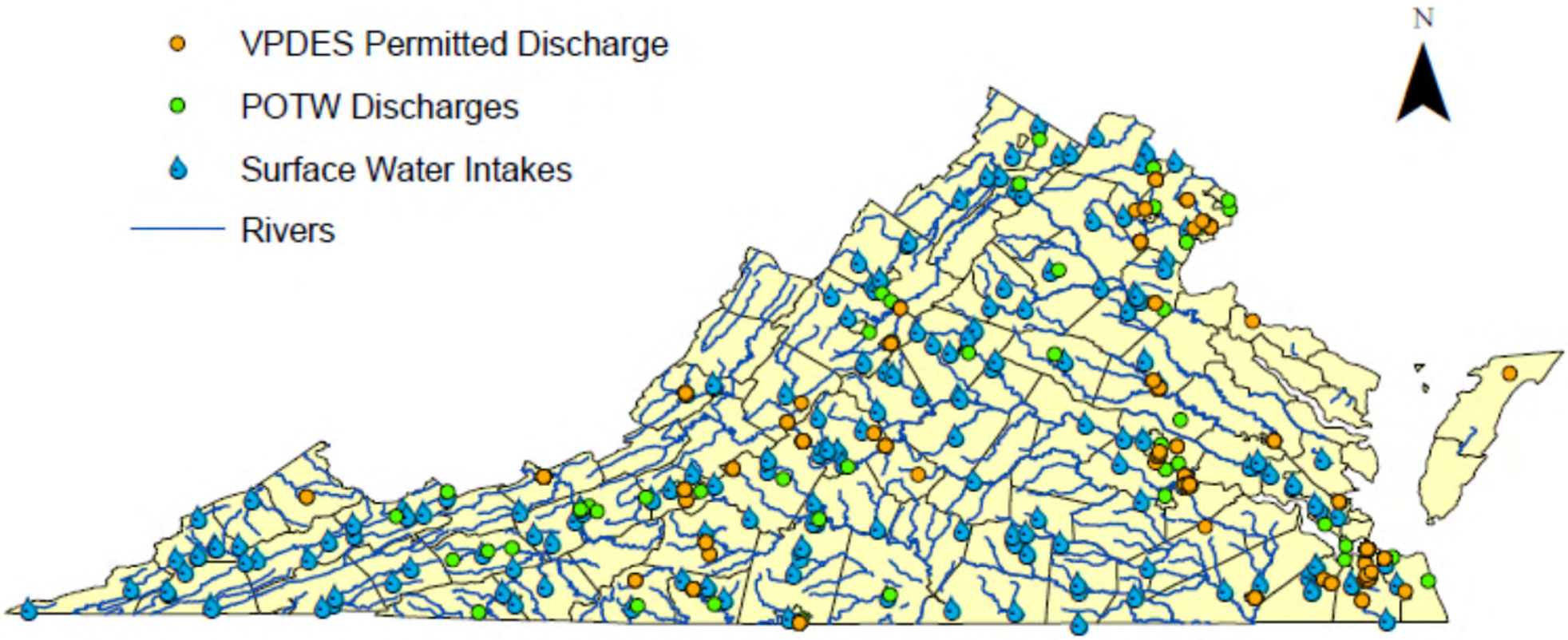

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Hybrid Approach

	# Samples	# Systems	Population
17 Large	33	17	4,541,619
12 Large	21	12	3,450,581
High Risk - all	6	5	13,329
Medium Risk - all	15	11	2,124
Source Water (17 Large)	17	17	
Source Water (12 Large)	22	22	
17 Large + High + Medium Risk + Source Water	71	50	4,557,072
12 Large + High + Medium Risk + Source Water	64	50	3,466,034
Maximum	100	50	

Sample site selection

Discussion:

1. Can we recommend the following phases:
    1. Large systems
    2. High and medium risk systems
2. Can we agree on a methodology for Major Sources?

Request Existing PFAS Monitoring Data - Homework

- This seems fair, however there will be discrepancies with methodologies.
- … ask for all available data that anyone is willing to share, regardless of testing methodology or date range.
- Calling for available data from within the past 3 years and, assuming it passes data quality standards, use any reports as data points to allow addition of additional sampling points in the study.
- Call for waterworks participation when they have the funding available for their own testing.
- Use UCMR5 data

Request Existing PFAS Monitoring Data

Criteria from waterworks:

- Sampled/analyzed in 2018 to date
- EPA Method 533 or 537.1
- Entry Points
- Raw Water
- Passes QA/QC

Virginia already has UCMR3 data

UCMR5 sampling in 2023 - 2025

Consider other data sources of environmental data?

Wrap-up

Are we ready to make a recommendation to the Virginia PFAS Workgroup on a PFAS Sampling Study Plan?

Action items due February 8

Next Meeting – Week of February 15 – survey and invite to follow

Public Comments

Have any Question, Comment or Suggestion, contact Us

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